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CLAIMS

1.   A node for a network, the network comprising a hierarchical structure in which a
5   node is considered to be at a higher level than a parent node to which it connects when
joining the network, the node being adapted to:

(a) maintain a primary connection to a node at a lower level in the network
hierarchy;

(b) to attempt to maintain a specified number N of further connections between the
10   node and other nodes in the network; and

(c) upon receipt of a request from a further node desiring to form its primary
connection with the node, and in the event that none of the N connections of the node is
unallocated, then to:

select one of the further connections which is not a primary connection for
15   one of the other nodes; and

to re-allocate that selected further connection to the further node so as to
form the primary connection for the further node.

2.   A node according to claim 1, wherein step (b) comprises the node forming one or
20   more connections with other nodes on the same level in the network as the node.

3.   A node according to claim 1 or 2, further adapted to attempt to maintain the
specified number of N further connections between the node and other nodes in the
network by periodically carrying out the following step:
25   for each unallocated one of the N connections, selecting a node from one or more
candidate nodes, and forming a connection with the selected node, until either the N
further connections have been successfully completed or there are no more candidate
nodes.

30 4.   A node according to claim 3, wherein the step of selecting the peer node
comprises selecting at random from the one or more candidate nodes.

5.   A node according to claim 3 or 4, wherein the step of selecting the node comprises
selecting on the basis of the range of the candidate nodes to the node.
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6.   A node according to claim 5, wherein the network comprises an overlay network formed over an underlying network of nodes, and wherein the range between a candidate node and the node comprises the number of links between them in the underlying network.

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7.   A node according to any preceding claim, further adapted to join the network by performing the steps of:

        selecting a parent node from one or more prospective parent nodes of the network, wherein the selected parent node is the node which is lowest in the network hierarchy; and

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        joining the network by forming a primary connection to the selected parent node.

8.   A node according to claim 7, further adapted to identify an other node as a prospective parent node on the basis of the range of the other node to the node.

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9.   A node according to claim 7 or 8, further adapted to identify an other node as a prospective parent node if it is within a specified range of the node.

10.   A node according to any preceding claim, further adapted, in the event that the

20   primary connection fails, to re-establish a primary connection with another node which is at a lower level in the network hierarchy than the node.

11.   A network, comprising a plurality of nodes each according to any preceding claim, in which the specified number N of connections is substantially the same for every node.

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12.   A method of operating a node in a network, the network comprising a hierarchical structure in which a node is considered to be at a higher level than a parent node to which it connects when joining the network, the method comprising:

        (a) maintaining a primary connection to a node at a lower level in the network

30   hierarchy;

        (b) attempting to maintain a specified number N of further connections between the node and other nodes in the network; and

        (c) upon receipt of a request from a further node desiring to form its primary connection with the node, and in the event that none of the N connections of the node is

35   unallocated, then:

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selecting one of the further connections which is not a primary connection for one of the other nodes; and

re-allocating that selected further connection to the further node so as to form the primary connection for the further node.

13.   A method according to claim 12, wherein step (b) comprises the node forming one or more connections with other nodes on the same level in the network as the node.

14.   A method according to claim 12 or 13, in which the step of attempting to maintain the specified number of N further connections to the other nodes in the network comprises periodically carrying out the following step:

for each unallocated one of the N connections, selecting a node from one or more candidate nodes, and forming a connection with the selected node, until either the N further connections have been successfully completed or there are no more candidate nodes.

15.   A method according to claim 13, in which the step of selecting the peer node comprises selecting at random from the one or more candidate nodes.

16.   A method according to claim 14 or 15, wherein the step of selecting the node comprises selecting on the basis of the range of the candidate nodes to the node.

17.   A method according to claim 16, wherein the network comprises an overlay network formed over an underlying network of nodes, and wherein the range between a candidate node and the node comprises the number of links between them in the underlying network.

18.   A method according to any of claims 12 to 17, further comprising the step of joining the network by performing the steps of:

selecting a parent node from one or more prospective parent nodes of the network, wherein the selected parent node is the node which is lowest in the network hierarchy; and

joining the network by forming a primary connection to the selected parent node.

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19.   A method according to claim 18, comprising identifying an other node as a prospective parent node on the basis of the range of the other node to the node.

20.   A method according to claim 18 or 19, comprising identifying an other node as a
5 prospective parent node if it is within a specified range of the node.

21.   A method according to any of claims 12 to 20, further comprising the step of, in the event that the primary connection fails, re-establishing a primary connection with another node which is at a lower level in the network hierarchy than the node.
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22.   A method of operating a network which comprises a plurality of nodes, the method comprising performing for every node the method according to any one of claims 12 to 21, and in which the specified number N of connections is substantially the same for every node.
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23.   A computer program comprising instructions for causing one or more processors to operate as the node according to any of claims 1 to 10 when the instructions are executed by the processor or processors.

20 24.   A storage medium carrying computer readable code representing instructions for causing one or more processors to operate as the node according to any of claims 1 to 10 when the instructions are executed by the processor or processors.

25.   A computer data signal embodied in a carrier wave and representing instructions
25 for causing one or more processors to operate as the node according to any of claims 1 to 10 when the instructions are executed by the processor or processors.

26.   A computer program comprising instructions for causing one or more processors to perform the method according to any of claims 12 to 22 when the instructions are
30 executed by the processor or processors.

27.   A storage medium carrying computer readable code representing instructions for causing one or more processors to perform the method according to any of claims 12 to 22 when the instructions are executed by the processor or processors.
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28.   A computer data signal embodied in a carrier wave and representing instructions for causing one or more processors to perform the method according to any of claims 12 to 22 when the instructions are executed by the processor or processors.